PHISICAL AND CHEMICAL PROPERTIES OF SOILS FOUND IN MINIS – MADERAT VINEYARD, ARAD COUNTY

PROPRIETĂȚILE FIZICE ŞI CHIMICE ALE SOLURILOR DIN PODGORIA MINIŞ – MĂDERAT, JUDEȚUL ARAD

CASIANA MIHUȚ, I. RUSU, ANIŞOARA DUMA-COPCEA, CAROLINA ŞTEFAN**

Banat's University of Agricultural Sciences and Veterinary Medicine Timisoara. Faculty of Agriculture. ***Faculty of Horticulture and Forestry*

Abstract: *The main objectives of the present study aimed the determination of physical and chemical properties for soils planted with grape vines in the Minis–Maderat vineyard, Arad county. Most grapevine plantations from the Southern part of vineyard offer excellent growth and development conditions for grapevines, especially for obtaining red wines. The most predominant soil types are forest auburn soils formed on grit stones and plates.*

Rezumat:*Cercetările care au făcut obiectul prezentei lucrări ştiinţifice au avut ca scop determinarea proprietăţilor fizice şi chimice ale solurilor ocupate cu viţă-de-vie din Podgoria Miniş-Măderat, judeţul Arad. Majoritatea plantaţiilor viticole din partea sudică a podgoriei se întâlnesc pe soluri care oferă condiţii foarte bune de creştere şi dezvoltare a viţei de vie, în special pentru vinuri roşii. Predominante pe platouri sunt solurile brun roşcat de pădure, profund de cumpănă pe gresii şi şisturi.*

Key words: *viticulture centre, physical properties, chemical properties*
Cuvinte cheie: centru viticol, sol, proprietăţi fizice, proprietăţi chimice.

INTRODUCTION

The soils found in Minis-Maderat vineyard, Arad county have generally evolved on grit stones and plates situated on slopes of 4 up to 25% and altitudes comprised between 140 – 225 cm.

The largest area of the considered vineyard is covered with eroded pre-alluvial soils and auburn pre-alluvial soils that occupy 25% and colluvial alluvial soils with 15% from the overall surface of Minis Maderat vineyard.

MATERIAL AND METHODS

The researches were performed in Minis-Maderat vineyard, the main soil types in the vineyard being represented by:

- colluvial alluvial soil
- eroded pre-alluvial soil
- auburn pre-alluvial soil
- profound sweep pre-alluvial soil

Relating to soil physical properties, we have determined:

- soil texture using Cernikova method
- soil porosity by calculations

Relating to soil chemical properties we have determined:

- humus content using Tiurin method
- soil reaction on the ground of potentiometric method, in water extract 1:2,5;
- total N content, in % using Kjeldhal method (soil mineralization is done by boiling with concentrated sulphuric acid in the presence of a catalyzing agent);

- content of total and mobile phosphorus determined by using Egner- Rhiem-Domingo UV-VIS spectrophotometer;

- content of assimilating potassium–extracted with ammonium acetate lactate and atomic absorption spectrophotometer.

RESULTS AND DISCUSSIONS

At the end of 19th century, in Arad county there were 20 viticulture profiled localities: Radna, Cladova, Păuliş, Miniş, Ghioroc, Cuvin, Covăsânţ, Şiria, Galşa, Mâsca, Maderat, Pâncota, Almaş, Agriş, Mocrea, Arăneag , Drauţ, Silindia, Ineu and Sebiş.

The climate of the micro-region is determined by the geographical position, the positioning of micro-relief forms, exposure, inclination degree, sheltering, winds, caloric particularities of soils, ground water but nonetheless the main factor that imprints significant differentiations regarding the climate is represented by the meteorological factor that has an overwhelming influence on yield potential of the territory.

The microclimate mapping of viticulture region, Minis performed by Gh. Calistru and Elena Socor in 1980 offered the possibility of knowing its natural potential under the influence of microclimate factors and inter-relations with grapevines. Among elements that have strong influences on microclimate, altitude and land exposure have a predominant role in confining the favourability extent for grapevine growing.

In Minis vineyard, it has been underlined the favorability for growing grapevines and obtaining of superior red wines. The region, as it has been demonstrated owns high propensity for grapevine cultivation, with long sunshine period superior comparing to other regions which implicitly increases monthly average temperature during vegetation. Among the above mentioned factors, one that directly influences grape yields and their quality is represented by soil with its physical and chemical properties.

As a result of performed researches in Minis -Maderat vineyard, Arad county, there have been determined the main physical and chemical properties of soils planted with grapevines. (table 1 and 2).

The soils found in Minis regarding their physical composition (table 1) have shown sandy textures within the group of colluvial alluvial soils found at the slope bases with high percentage of sand 80% in the detriment of clays and colloidal particles.

Table 1.

The main physical properties of soils from Minis Maderat vineyard, Arad county

Soil unit	Depth cm	porosity %	skeleton %	colloidal particles	physical clay %	sand %
Colluvial alluvial soil sandy –clayed on alluvial deposits	0-20 40-60	60 55	18,5 20,9	3,3 7,3	16,6 24,9	80,1 67,8
Eroded pre-alluvial soil, sandy-clayed formed on grit stones and plates	0-20 40-60	65 60,2	25,3 40,2	3,0 7,2	23,0 27,1	74,0 65,7
Pre-alluvial soil with superficial skeleton, sandy-clayed	0-20 40-60	62 57	21,0 39,0	15,3 25,1	22,5 31,4	56,2 43,5
Pre-alluvial soil, profound formed on grit stones and sits	0-20 40-60	48 29	- -	35,7 40,3	39,6 38,9	24,7 20,8

In inferior third of mountain slopes are found the eroded pre-alluvial soils that present a high percentage of skeletons of 25-40% and clay particles and physical sand being included in the soil group with medium texture. The superior third of mountain slopes are regularly pervaded by auburn, superficial pre-alluvial soils exhibiting an advanced erosion and lack of

vegetation with arable horizon of 30-70 cm. These insure a satisfactory water and air regime and are generally regarded as light soils with solid skeleton 21-39%.

Approximately 25% of grapevine plantations from Minis-Maderat vineyard are planted on hill plateaus where predominant soil types are pre-alluvial soils, profound sweep soils lacking skeleton with high percentage of clay 39% and colloidal particles 35-40%, which confers strong retaining capacity and reduced permeability.

In table 2, there are presented the main chemical properties of soils found in Minis-Maderat vineyard, Arad county

Table 2.

The main chemical properties of soils found in Minis- Maderat vineyard, Arad county

Soil unit	Depth cm	pH	Humus %	N %	P total %	P_2O_5 mobile mg/100 g	K_2O schimbabil mg/100 g
Colluvial alluvial soil sandy –clayed on alluvial deposits	0-20 40-60	6,5 6,7	0,71 0,77	0,09 0,10	0,30 0,29	8,5 7,9	5,2 5,1
Eroded pre-alluvial soil, sandy-clayed formed on grit stones and plates	0-20 40-60	6,4 6,6	0,66 0,38	0,08 0,08	0,27 0,20	7,5 6,4	4,8 4,8
Pre-alluvial soil with superficial skeleton, sandy-clayed	0-20 40-60	6,4 6,8	1,05 0,43	0,11 0,07	0,26 0,35	7,5 7,0	5,2 5,0
Pre-alluvial soil, profound formed on grit stones and sists	0-20 40-60	6,44 6,6	1,32 0,95	0,10 0,06	0,37 0,22	7,6 6,3	13,8 12,0

Superficial auburn pre-alluvial soils from Minis situated on plateaus are rich in humus 0.9-1.3%, moderately supplied with N 0.09- 0.11% and mobile phosphorus 6.3 -8.5 mg/100 g soil but poorly supplied with mobile potassium.

The content in nutritive elements differs in terms of soil, genetic type, maternal rock, climate conditions cultural state, etc.

Eroded pre-alluvial soils rich in skeleton with rock situated at small depth are mostly found on slopes with poorness regarding organic matter, low content of total nitrogen, mobile phosphorus and potassium. Similar situation regarding the fertilizing elements is found for colluvial alluvial soils found at slope bases. In case of Minis, soils have acid to neutral reaction with pH varying between 6.4-6.8.

CONCLUSIONS

As a result of the researches performed in Minis-Maderat from Arad county, it has been concluded that:

- concerning the physical composition of colluvic alluvial soils pervading slope bases, they presented a light texture with high percent of physical sand 80% in the detriment of clay and colloidal particles;
- in the inferior third of mountain slopes, eroded pre-alluvial soils present high percent of skeleton 25-40%, clay particles and physical sand falling into the soil group with medium texture;
- the superior third of mountain slopes are occupied by superficial auburn pre-alluvial soils with advanced erosion and lacking vegetation;
- approximately 25% of grapevine plantations within this vineyard are planted on hill plateaus where predominant soil types are pre-alluvial soils, profound sweep soils lacking skeleton with high percentage of clay 39% and colloidal particles 35-40%;

- pre-alluvial soil, profound sweep situated on plateaus are rich in humus, moderately supplied with N and mobile phosphorus but poorly supplied with mobile potassium.

- Eroded pre-alluvial soils rich in skeleton and colluvial alluvial soil from slope bases with rock situated at small depth are mostly found on slopes with poorness regarding the organic matter, low content of total nitrogen, mobile phosphorus and potassium;

In conclusion, it may be assessed that Cadarca variety used for wine and obtained on colluvial alluvial soils is more extractive with high content of mineral components, velvety and intensely coloured comparing with the wine obtained for the same variety but grown on pre-alluvial soils.

REFERENCES

1. BACIU I.,VANC F. - Sistemul de tăiere şi conducere la principalele soiuri cultivate în podgoria Miniş - Măderat. SCPVV Miniş. Volum omagial, 1987.
2. CALISTRU GH. - Studiul ecologic al soiurilor de struguri pentru vin din podgoriile Banatului, Teză de doctorat.
3. CALISTRU GH. - Cartarea microclimatică a centrului viticol Miniş în relaţiile cu cerinţele viţei de vie.
4. POPA P. - Caracterizarea agroproductivă a solurilor din podgoria Miniş, măsuri pentru realizarea unor producţii viticole eficiente. Teză de doctorat, 1980.
5. POPA P., CRIŞAN I. - Nutriţia minerală a viţei de vie în podgoria Miniş. Rez. de horticultură şi viticultură nr. 12, 1973.
6. POPA P. SI COLAB - Caracterizarea agroproductivă a solurilor din podgoria Miniş .SCPVV Miniş. Volum omagial, 1980.
7. POPESCU ŞT. - Studiul potenţialului de producţie a biotipurilor soiului Cadarcă, în condiţiile centrului viticol Miniş. Rezistenţa Grădina, Via şi livada, nr.V, Bucureşti, 1959.